



HIGHLIGHTS REPORT

AUTUMN 2016



Cover photos:
Imperial Valley, California
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U.S. EPA Region 9

MESSAGE FROM THE NATIONAL COORDINATORS

The Border 2020 Program has established a strong alliance between our two countries and reinforces, more than ever, the message that cooperation is the best way to achieve integral solutions to environmental and public health challenges that we face today at the local, regional and global levels. The cooperation model promoted in the framework of this Program has been, and is fundamental to ensuring that border communities are developed sustainably and in harmony with the environment.

During nearly three decades of collaboration between our two countries, we have achieved benefits that improve the quality of life of communities on both sides of the border, and the preservation of our common environment. For example, we have collaborated with the Border Health Commission to identify and address joint environmental and public health priorities and concerns in the border region. We have worked together to improve children's health and promote environmental health education and outreach to vulnerable populations.

This report contains some highlights of the achievements and efforts of the Border 2020 Program during the last two years. We are pleased that during the last two years of work, thirty-five projects have been concluded to improve conditions facing border communities and eleven are in the implementation phase. These projects have addressed challenges of clean water, air quality, proper management of solid waste, environmental emergency response and environmental stewardship.

Now that we are halfway through the implementation period of the Program, we, as National Coordinators, reiterate our support to partners from government at all levels, including tribal governments in the border states of the United States and the Mexican indigenous communities. We also appreciate the support and commitment of all individuals, communities, organizations and institutions involved in the many activities of the Program and whose participation is critical to improve environmental and public health conditions in the border region. We recognize and celebrate all these efforts; the dedication and commitment of every person involved in this Program has been essential to the successful completion of its ambitious goals and objectives.

We invite you to take stock of our recent achievements and renew, with us, your continued support and commitment for comprehensive binational solutions to address the public health and environmental challenges that persist in the border region. Working together we can manage our shared resources effectively and efficiently to meet these challenges.

Thank you very much!

Jane Nishida
National Coordinator
United States of America

Enrique Lendo
National Coordinator
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Introduction

At the midpoint, 2014-2016.

The U.S.-Mexico Environmental Program: Border 2020 is the fourth iteration of the border cooperation between U.S. and Mexico under the La Paz Agreement of 1983. The purpose of the Program is to address the environmental and health related challenges facing border communities. Similar to past Border Environmental Programs, the Border 2020 Program is a partnership between the U.S. Environmental Protection Agency (USEPA), the Secretariat for Environment and Natural Resources of México (SEMARNAT), the ten Border States, the U.S. Border Tribes, Mexican Indigenous Communities, NGOs, communities and stakeholders. The Border 2020 Program also embraces a strong partnership with the Border Environment Cooperation Commission (BECC) to administer USEPA's resources to implement projects and to provide technical assistance and support regional and the National Coordinators meetings.

This highlights report contains short summaries of a sample of border projects that cover a range of activities including scrap tire and urban waste management, environmental health awareness, air and water quality, emergency response, and wastewater treatment, among others.

If you want to know more detail on the goals and objectives of the Border 2020 Program, we invite you to read the Border 2020 Framework Document. To read past reports, please visit the [USEPA](#) and/or [SEMARNAT](#) web pages.

GOAL 1: REDUCE AIR POLLUTION

Characterization of drayage vehicle activities and emissions in the Laredo air shed.

The Border 2020 Program awarded Texas A&M Transportation Institute (TTI) a grant for approximately \$89,750 USD, in order to study the activities and emissions of drayage truck transportation along the Laredo-Nuevo Laredo border crossing. Drayage vehicle activity is a significant component of total on-road vehicle activity and mobile source emissions in the Laredo-Nuevo Laredo airshed. Currently, the air quality impacts of drayage trucks are only partially captured in regional emissions inventories through vehicle activity estimations based on the regional travel demand models (TDMs). These TDM-based estimates are the main source of information on drayage activity in the region. The objective of the project was to develop a detailed understanding of the regional drayage truck activity within the Laredo-Nuevo Laredo region using the Motor Vehicle Emission Simulator (MOVES) model to estimate the emission rates for particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), hydrocarbons (HC), and carbon dioxide (CO₂).

The study included the installation of GPS units on northbound fleet trucks entering the U.S. from the

Laredo port-of-entry (POE) that monitored the truck's distance, speed, duration, and emissions for each trip. The speed of the vehicle was used to determine the emissions output of the vehicle through emission estimates using EPA MOVES database. The maps produced from the data collected helped to picture the movement of fleet trucks in the region and provided for a substantial visual for any future infrastructure plans and possible policy strategies. Following the study, TTI held a stakeholder workshop to present its findings and gather stakeholder input on potential recommendations for follow-up actions to include possible strategies to reduce pollutants from drayage activity in the Laredo-Nuevo Laredo Region.

The results of the study showed that Columbia Bridge crossing in Laredo is the most utilized port of entry in the region and is associated with relatively high emissions caused by high truck volumes and slow speeds. The specific geography of the Colombia Bridge POE, and truck facilities on the U.S. side of the border results in high truck volumes, low truck speeds, and therefore high emissions adjacent to urban areas of Laredo. The infor-

mation from the report produced by the project could be used with previously published work on drayage truck emissions to evaluate the likely emission impacts of 1) improvements to the network such as the development of alternative routes or new or improved border crossing facilities; or 2) improvements to the truck fleet. The relative impacts of each strategy, in addition to estimates of the costs associated with each, would provide an objective framework for cross-border freight decision making.

A stakeholder workshop was held in Laredo on December, 2015 that furthermore collected valuable feedback from participants for the project. Feedback from stakeholders was

categorized by: 1) Coordination and Outreach and 2) Technical recommendations. The "Coordination and Outreach" recommendations included to 1) develop regular Air Quality (AQ) workshops to keep stakeholders updated; 2) grow a proactive AQ management committee or interest group; 3) Increase AQ educational materials.

The Technical recommendations focused to: 1) develop further border studies; 2) develop a real-time border data tool; 3) develop emission analysis methods with varied transport emission; 4) develop an AQ border education web portal; 5) incorporate studies of the health impacts for POE pedestrian traffic.



Installation of GPS Units (below) on Transportes FEMA vehicles (above).

Border 2020 supports effort to inventory and address air emissions in Nogales.



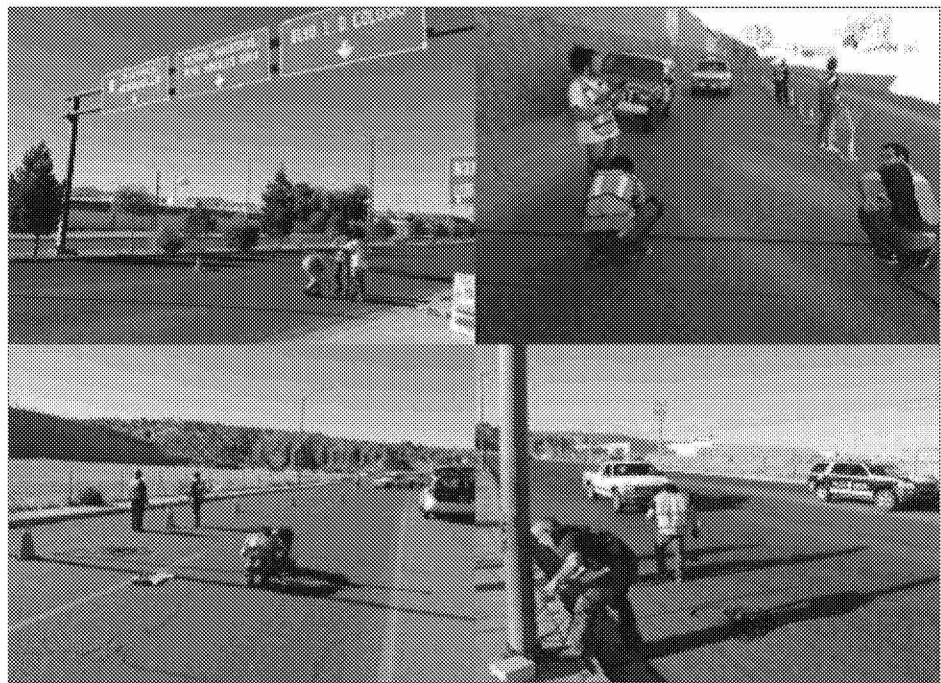
Mayor David Cuauhtémoc Galindo Delgado discusses Border 2020 PROAIRE project.

With the support of the U.S. Environmental Protection Agency and the Border Environmental Cooperation Commission through a Border 2020 Program grant, the city of Nogales, Sonora, developed in August 2016 its PROAIRE, a strategy to reduce air pollution based on a detailed analysis of local emissions sources, meteorology, air quality, potential pollution controls, and other considerations. The PROAIRE program recommends thirteen planned measures including strengthening regulations for commercial establishments, reducing dust from paved and unpaved roads, implementing a vehicle emissions testing program, strengthening the ambient air quality monitoring system, and developing an environmental education program. The PROAIRE also establishes goals and indica-

tors for each measure. The measures, goals, and indicators were developed by a "Core Committee" of environmental, planning, and development professionals representing Mexican local, state, and federal government as well as the academic sector. Architect David Cuauhtémoc Galindo Delgado, Mayor of Nogales, leads the Committee. The PROAIRE document was developed with the guidance of the Core Committee by a Border 2020 Program grantee who had previously developed an emissions inventory of Nogales with support of the Border 2020 Program, which helped to inform the focuses of the PROAIRE program.

The inventory considered the sources of emissions including PM₁₀ (inhalable particles, with diameters that are 10 micrometers and smaller) and PM_{2.5} (fine inhalable particles, with diameters that are 2.5 micrometers and smaller). The inventory showed that in Nogales 87 percent of PM₁₀ emissions and over half of the PM_{2.5} emissions were from paved and unpaved roads, and almost half of the PM_{2.5} emissions were from wildfires. Wildfires were also found to be the principal cause of sulfur dioxide (SO₂) emissions. Emission of carbon monoxide (CO) and nitrogen oxides (NO_x) were attributed to motor vehicles in

Nogales and emissions of ammonia (NH₃) were found to come from livestock. Nogales, Sonora, a city of 250,000 inhabitants is directly across the border from Nogales, Arizona. Although Nogales, Arizona, is in non-attainment with the health-based national ambient air quality standards for PM₁₀, the State has demonstrated that it would be in attainment "but for" emissions from Nogales, Sonora.



Aspects of the work during the vehicular activity identification stage in Nogales.

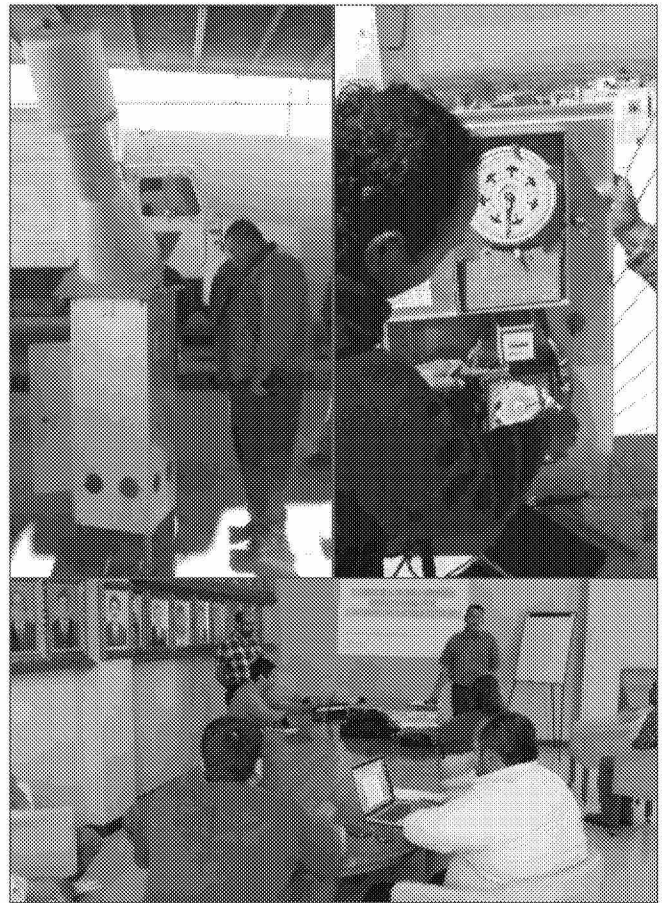
Improving air quality monitoring in Ojinaga.

The municipality of Ojinaga, Chihuahua, received a grant for approximately \$14,327 USD to help address improving air quality monitoring for PM₁₀. The funded project helped to establish and provide adequate maintenance and calibration of existing air quality monitoring equipment the city owned and established a mechanism for informing the public of the adverse health impacts from exposure to PM₁₀.

The grant helped to fund the replacements parts and maintenance needed for three PM₁₀ monitors. Additionally, three training events were conducted for air quality technicians from Ojinaga. Staff from the Department of Renewable Energy and Environmental Protection that is part of the Center for Advanced Materials Investigation (CIMAV,

by its acronym in Spanish) in Chihuahua conducted the training. Technical operators were trained in the importance of monitoring PM₁₀, as well as, given demonstrations and proper training for upkeep, maintenance and calibration of the monitors.

Through these trainings, city staff were able to setup and establish a rigorous calibration schedule as follows: 1) upon installation; 2) after performing maintenance to the vacuum; 3) once every three months and; 4) after 360 hours after sampling. The project also helped city staff develop a communication plan to inform the 26,000 inhabitants of Ojinaga of instances when PM is above regulatory standards.



The training events provided by staff from CIMAV.

Prioritizing emissions mitigation strategies at the Mariposa Port-of-Entry.

Millions of vehicles cross between Mexico and the United States each year and long queues of idling vehicles are a common sight at ports-of-entry (POEs). In 2014, the 25 land border crossings from Mexico into the U.S. processed 5.4 million heavy-duty vehicles (HDVs), 2.1 million buses and 6.96 million light duty vehicles (LDVs). While the volume of traffic at POEs presents significant environ-

mental and health challenges to the air quality in the vicinity of the ports, opportunities exist to reduce these emissions, in the short-term, mid-term, and long-term. Under a Border 2020 Program grant sponsored by the USEPA and the Border Environment Cooperation Commission, researchers at Arizona State University assessed emissions from northbound vehicles at the Mariposa POE between

Nogales, Sonora, and Nogales, Arizona, and modeled the effects of potential emission reduction strategies.

The researchers used historical information from the U.S. Bureau of Transportation Statistics as well as field data (including volume, service time and speed distributions) obtained from a two-day data collection at the port to es-

tablish a simulation model in VISSIM 7.0, a microscopic multi-modal traffic flow simulation software package. The results from VISSIM are input to MOVES (Motor Vehicle Emission Simulator), a state-of-the-art emission modeling software developed by USEPA, to analyze emissions. The study considered emissions of Nitrogen Oxides (NO_x), Particulate Matter less than 2.5 microns (PM_{2.5}), Sulfur

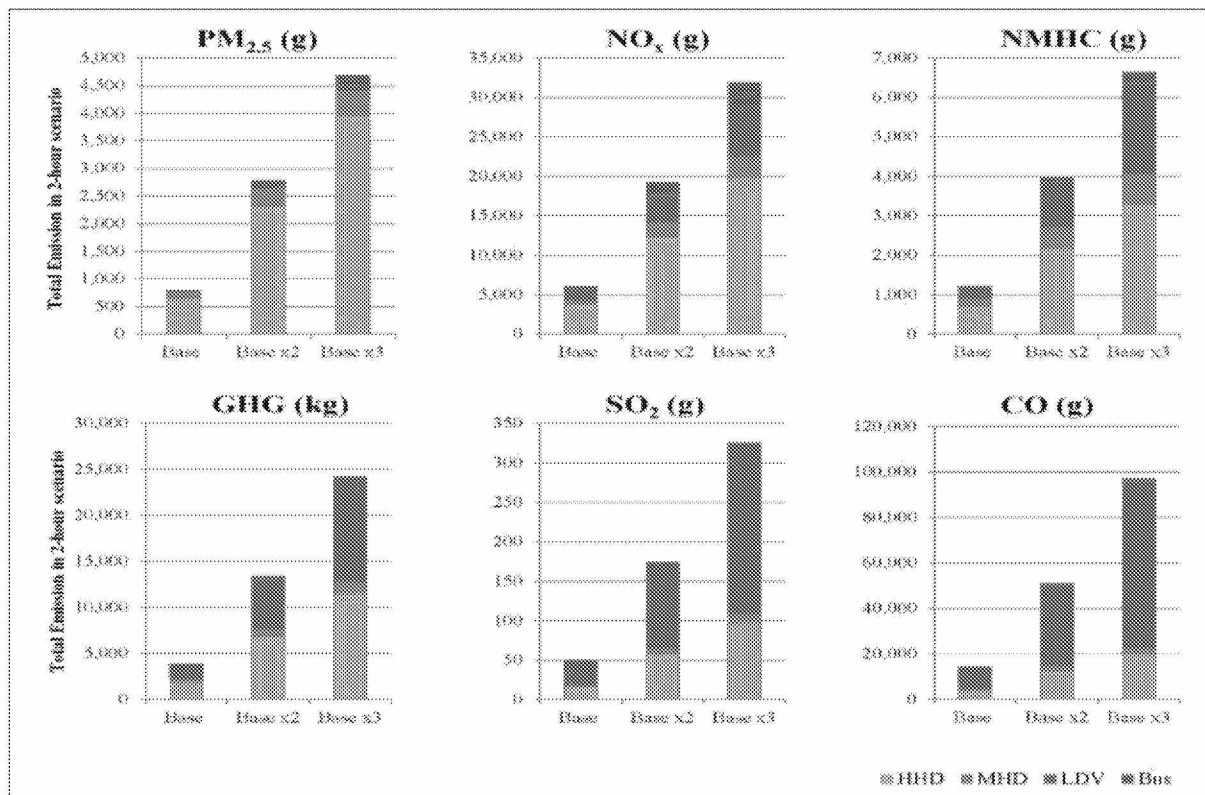
Dioxide (SO₂), Carbon Monoxide (CO), and Non-Methane Hydrocarbons (NMHC), as well as greenhouse gas emissions (GHG).

The researchers assessed various short and long-term steps to mitigate future emission increases at the Mariposa POE. As expected, quantities of emissions at the Mariposa POE were found to vary based on the traffic volume, wait time, vehicle types, fuel types, vehicle age and the pollutant being considered. Key findings included:

- Increases in traffic vehicle volumes result in non-linear increases in waiting times and all emissions analyzed. Doubling traffic volumes would be expected to result in increased emissions between 2 times to nearly 4 times.
- Opening all primary inspection lanes results in a 13 percent reduction in emissions for PM_{2.5}, NO_x, and NMHC and an approximately 30 percent reduction in GHGs, SO₂, and CO.
- Expanding enrollment in FAST¹ from the current baseline of 10% up to 20%, results in emissions savings between 4-11 percent across pollutants.
- Sulfur in fuel can impede the efficiency of emission control devices for other pollutants. In the fuel sensitivity analysis, using higher sulfur fuel increases non-sulfur emissions by 55% for LDV and up to 20% for HDV.
- Updating HDV and LDV to latest models results in 95 percent reduction for PM_{2.5}, NO_x, and NMHC; an 81 percent

reduction for CO; and a 15 percent reduction for GHGs and SO₂.

- If all LDVs were switched to electric vehicles (EVs) and all HDVs were switched to compressed natural gas (CNG), emissions could be reduced 93-99 percent across all pollutants at the POE.



Example of the data found by the study: Emission Changes from Increased Vehicle Volumes.

¹ The Free and Secure Trade (FAST) program is a Federal U.S. commercial clearance program for known low-risk shipments entering the United States from Canada and Mexico that allows expedited processing for commercial carriers who have completed background checks and fulfill certain eligibility requirements.

New Mexico-Chihuahua border study on air quality.

The State of Chihuahua Department of Health in coordination with the Autonomous University of Ciudad Juárez (UACJ, by its acronym in Spanish) was awarded a Border 2020 Program grant of \$28,725 USD to conduct a study that looked at getting a better understanding of the causes and sources of particulate matter (PM) in air pollution in the Paso del Norte region that impact public health. The grant helped support a portion of a much larger project funded by the New Mexico Department of Health, Office of Border Health, that funded the project from 2010-2013.

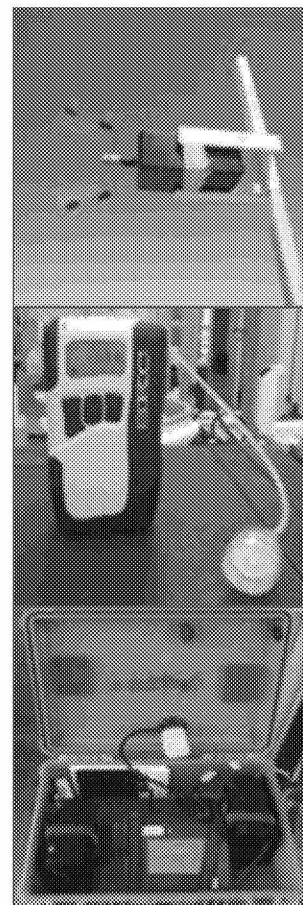
The project looked at: 1) measuring PM concentrations from unpaved road dust at several locations in Juárez, Chihuahua, 2) collecting dust samples during spring dust storm events in Juárez, 3) evaluating a precipitation prediction model along the border

using inexpensive rain gauges and 4) inventorying geospatial data layers that are useful for calculating pollutant emissions inventories. In addition, since there is no air monitoring in Palomas, Chihuahua, a smaller study was conducted there to look at estimating PM₁₀ emissions from vehicles traveling on the unpaved roads.

The project sponsors found that PM during natural dust storms were associated to low soil moisture, fine sand soil texture, and unpaved roads. The experiment revealed that the PM concentrations were more heavily affected by vehicle speeds on unpaved roads as opposed to variant wind speeds. The project portion that took place in Palomas estimated that potentially 268 tons of PM₁₀ is generated per year from vehicles traveling on the unpaved roads there, however, there is still the potential for additional tons of

PM to be generated from wind erosion and also taking into account tail pipe emissions from the vehicle engines.

Based on the results of this study, particulate matter exposures from unpaved roads remain a health concern in the study area with further studies needed to evaluate other factors that may be contributing to PM emissions. There is a need to continue support work to quantify wind erosion from disturbed and undisturbed vacant lands across the region, as well as, to quantify the dust flux across areas in the Chihuahuan Desert, as very little research in this area has been done. Finally, since there are very few precipitation measurements in Chihuahua and they are important for assessing and predicting drought and dust, it is recommended that more observing locations be started.



Instruments used to measure PM from dust storms, and for experiments in unpaved roads.



Sampling points at the communities of Ramón Rayón, Gómez Morán and Las Torres in Juárez.

GOAL 2: IMPROVE ACCESS TO CLEAN AND SAFE WATER

Management of fat, oil and grease in Nuevo Laredo.



Participants at one of the training workshops held in Nuevo Laredo.

A Border 2020 Program grant of \$32,533 USD was awarded to the Municipal Commission of Potable Water and Sewer of the City of Nuevo Laredo (COMAPA, by its acronym in Spanish) to help address the issues of fats and oils in their sewage system.

The technicians at

COMAPA noticed that the municipal drainage system continually had obstructions from the presence of animal fat or vegetable oils.

The grant helped to address the needs of educating local businesses with: state and local laws regarding wastewater; education on the proper pre-treatment equipment needed at their business to deal with used oil/grease; and provide alternative solutions to the disposal of such waste. Another goal was to help establish used oil and grease

collection centers to properly handle the collection of these from businesses and alleviate issues associated with excessive grease and oils in the wastewater drainage system.

The project sponsors were able to achieve their goals through meetings with the local university, Technological University (UT, by its acronym in Spanish), through conducting training and implementing the appropriate infrastructure for the grease traps. Information was presented to the public via television, newsprint, radio and social media on the im-

portance of proper disposal of waste grease and/or oil in order to prevent blockages in the drainage infrastructure. Local businesses were educated on the proper disposal of grease and oil through a number of workshops held throughout the city. At the end of the project, 449 local businesses (3 persons per business) were provided with the necessary tools to establish procedures for proper disposal, as well as, strengthening the communication with its employees on the regulations and procedures. In addition, 13 businesses installed the oil and grease traps for their business.

Urban keyhole gardens rainwater-harvesting techniques.

The El Paso Water Utilities received a Border 2020 Program grant of approximately \$6,000 USD to help demonstrate that urban landscapes can incorporate small-scale intensive growing beds to grow a variety of plants utilizing rainfall or runoff, supplemented by very little irrigation. The project is part of a larger effort of the El Paso Water Utilities thru the "The Urban Keyhole Gardens" of the Tech H₂O Water Resources Learning Center. The project helped showcase to the public that by incorporating simple and efficient techniques, they themselves can create a multipurpose garden at home as a source of vegetables and fruits to improve nutrition,

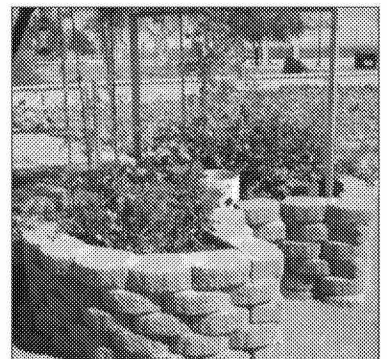
especially for children. The project scope entailed establishing two permanent keyhole gardens and a 1,600 sq. ft. fruit orchard site. In addition to the establishment of the gardens, the project focused on public outreach workshops and training workshops, as well as, education sessions with students from the community.

The initial stages of the project including preparation of the site that included fencing the area of use, clearing debris and weeds, followed by the installation of a drip irrigation system with water meters. The second step initiated the construction of the keyhole garden structures. Thereafter, the planting of fruits and

vegetables were completed by children attending summer camp activities. A total of 20 trees were planted, along with vegetables that included: winter crops such as broccoli, Chinese cabbage, celery, kale and regular cabbage; and summer crops that included cherry tomatoes, basil, string beans, cucumbers, sugar snaps and melons. The education and community outreach came in the form of school and community group field trips and a few demonstrations that were open to the public.

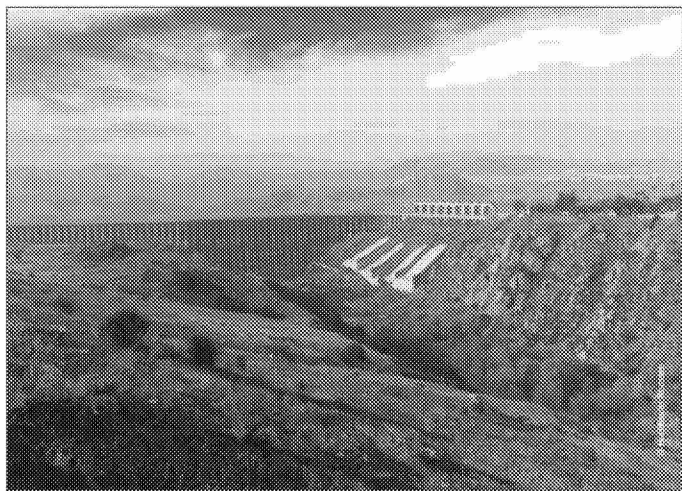
The project demonstrated that rainwater-harvesting techniques ultimately help conserve water in the border region of El Paso-Ciudad Juarez. It also

provided public education regarding composting processes that would alleviate landfill waste. The gardens remain open to the public during events for children and workshops for the public. A total of 14 workshops, training and education sessions were held to reach over 956 community members.



One of the keyhole gardens constructed.

Border 2020 Program supports the restoration of the Tijuana River.



The Tijuana River with the Abelardo L. Rodríguez dam in the background.

The region of the Tijuana River basin is internationally recognized for its diversity and as the habitat for important groups of endemic flora and fauna. This basin covers 4,430 km², with two thirds of it located in Mexico and a third part in the USA. The Tijuana River has a length of 195 km, starting south of Tijuana, Baja California, with its estuary in southern California a few kilometers from the Mexico-US border. Its main tributaries in Mexico are the Alamar River and the river system *Las Palmas* (this river system feeds the water reservoir of the *Abelardo L. Rodríguez* dam) while

in the United States its main tributary is the Cottonwood Creek system. Through the city of Tijuana, the river runs in a concrete channel to the border.

With the support of the Border 2020 Program, *Pronatura Noroeste* (a non-profit organization based in the city of Ensenada, Baja California) worked on a project designed to restore a 3 km stretch of the Tijuana River in the area downstream of the *Abelardo L. Rodríguez* dam, the only section of the river not channelized with concrete. The project included the regeneration of the riparian eco-

system of the river along with the recovery of natural spaces for recreation and environmental education of the community. The project included:

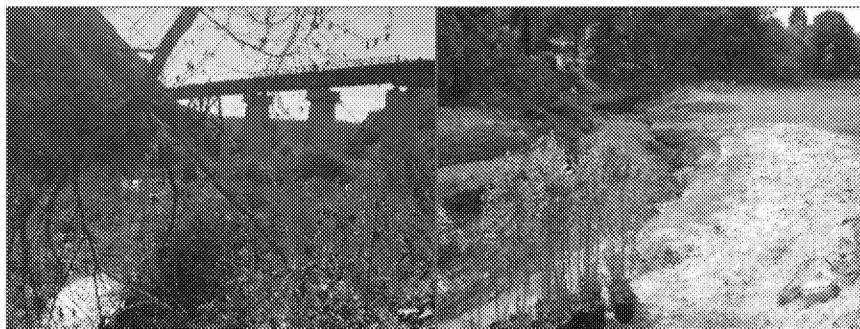
- Inventorying the birds and seasonal vegetation (35 different species of birds were identified);
- Removal of 238 tons of garbage, debris, sediment and invasive vegetation;
- The reforestation with 106 willow tree cuttings;
- Hydrological modeling and design of hydrological modifications that will allow river flows to infiltrate into an aquifer while not flooding nearby structures;
- An agreement from the State and Federal Water Commissions of Mexico to dedicate 30% of the treated effluent of the nearby wastewater treatment plants for river restoration;
- Two educational videos about the river that can

be found in this [link](#); and

- Outreach activities, including participation in Tijuana's 2015 Environmental Fair, a photographic exhibition, and a volunteer trash cleanup day.

It is important to highlight that an agreement between *Pronatura Noroeste* and the National Water Commission of Mexico was reached, which will allow the protection and conservation of this area of the Tijuana River for 30 years.

In collaboration with the Border 2020 Program, the Municipality of Tijuana, Baja California's State Government and Federal Government of Mexico, *Pronatura Noroeste* is planning the second stage of this project for the recovery and conservation of the Tijuana River ecosystem.



A section of the Tijuana River basin before the start of the work and another section after the restoration activities.



Planting the willow tree cuttings.

Conservation of the Arroyo Las Vacas in Acuña.

The Border 2020 Program awarded a grant of \$44,200 USD to the Secretariat of Environmental for the State of Coahuila (SEMA, by its acronym in Spanish) towards the conservation of the Arroyo Las Vacas (River Las Vacas) in the municipality of Acuña, Coahuila. The project proposed to design and implement actions to improve water quality and support a suitable habitat for the local plants and wildlife by bringing together educational institutions and business associations to work together. Partners included the Technological Institute of Acuña City (ITSA, by its acronym in Spanish), Municipality of Acuña, the University of Texas at Austin, EPA's National Risk Management Research Laboratory (NRMRL), the Texas Commission on Environmental Quality and BECC.

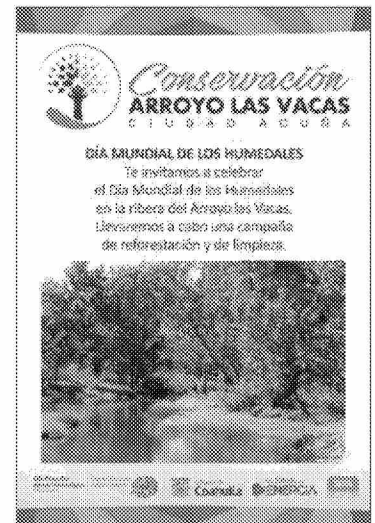
The objectives of the project included documenting the broader ecosystem of the river's flora and

fauna indigenous to the area. Clean-up and reforestation events aimed at conservation were conducted by binational universities and businesses. Additionally, outreach was conducted towards the community to increase consciousness of the preservation of the river and its potential for recreational uses.

Overall the project accomplishments included: 1) the establishment of a binational working group comprised of United States and Mexico Federal, State, local governments as well as academic institutions; 2) diagnostic survey of the river; and 3) implementation of five binational conservation programs that included water quality monitoring, inventory of flora and fauna, identification of point sources of contamination, enforcement and reforestation.

Through the project over 441 species of flora and fauna were registered,

with approximately 31 of them identified on the Protected Species list under Mexican Law (NOM-059-SEMARNAT-2010 law). The project encouraged the participation of utilizing university students to conduct some of the surveys and sampling of the river. Results of the diagnostics survey of the river were presented at a workshop attended by 35 participants representing 14 different institutions. In addition, during the project 35 wastewater discharges into the river were documented and through the identification of 14 illegal activities along the river, 3 enforcement actions against industry took place. The project included a river clean-up event with the reforestation of over 225 native trees. Next steps include the establishment of a more permanent working group that will continue to do clean-up and conservations efforts of the river.



One of the posters of the public campaign to promote the conservation of the River Las Vacas.



Participants of the reforestation event.



One section of the River Las Vacas before and after the clean-up event.

Border 2020 Program supports development of a sediment model for Tijuana watershed sub-basin.



Dr. Trent Biggs from SDSU and Napoleon Gudiño of CICESE measure channel erosion.

During storm events in Tijuana large gullies form in unpaved roads of the city which make them impassable, access to trash collection and emergency services unreliable and buildings susceptible to collapse. These gullies also produce massive sediment loads that feed into the Tijuana River Estuary, located just north of the border. The U.S. spends approximately \$3M annually to remove trash-laden sediment from the Tijuana River Valley and Estuary. Efforts to control sediment and trash inflow into the estuary often prove inadequate, resulting in destruction of wetlands, flooding throughout the Tijuana River Valley, and hydrologic conversion of saltwater to freshwater marsh.

The Tijuana National Estuarine Research Reserve (TRNERR) is the last coastal wetlands in southern California not bi-

sected by a freeway or railroad. Considered a wetland of international importance by the United Nations, it provides habitat to nearly 400 species of birds. The River and Estuary are listed by the State of California as “impaired” due to sediment and trash under 303(d) of the Clean Water Act. However, because most of the sediment comes from Mexico, the State of California cannot address the pollution through a regulatory approach and State officials have frequently reached out to the U.S. Government for help. As a result of these requests, the reduction of sediment and trash into the Tijuana Estuary was identified as a top priority in the Border 2020 Program. Furthermore, the recently adopted U.S. Mexico Treaty Minute 320 aims specifically to reduce sediment and trash in the Tijuana River Watershed through binational collaboration. The U.S. and Mexican Commis-

sioners of the International Boundary and Water Commission (IBWC) signed this “Minute”, which is an addendum to the 1944 Colorado River Water Treaty between U.S. and Mexico, in September of 2015.

San Diego State University researchers from the Department of Geography and the Ensenada Center for Scientific Research and Higher Education (CICESE, by its acronym in Spanish), with assistance from scientists from USDA’s Agricultural Research Service, the USEPA Office of Research and Development and USEPA Region 9 Office developed a sophisticated model that couples a hillslope runoff and sediment production model (Agricultural Non-Point Source Pollution Model or “AGNPS”) with a channel routing and erosion model (Conservational Channel Evolution and Pollutant Transport System or “CONCEPTS”). With the coupled model and field observations, including aerial images taken from a drone, the research has:

- Identified erosion hotspots in the sub-basin, including soil types that are vulnerable to erosion and gully;
- Established that sheet and rill erosion on vacant lots and roads are signifi-

cant sources of sediment along with gully formation and channel erosion;

- Estimated the watershed-scale impact of different management actions (such as paving all roads);
- Identified key locations that would be ideal targets for implementation of best management practices;
- Provided hydrographs to University of California at Irvine for their 2-D flood model; and
- Informed government officials in Mexico and the U.S. of findings via numerous workshops.

Results from the model suggest that paving all the roads in the sub-basin could reduce sediment loads across the border by 40%. Widespread road-paving, however, in *Los Laureles* (aka, “Goat Canyon”) is unlikely in the near future due to the high cost. Furthermore, road-paving with impervious asphalt or concrete will increase peak flows in the transboundary river by 20%, resulting in a greater increase in flooding potential on both sides of the border. The complete findings will be published in 2017.

United States-México Border Water Infrastructure Program.

The U.S.-Mexico Border Water Infrastructure (BWIP) Program funds the planning, design, and construction of high priority water and wastewater infrastructure for underserved border communities. The Program protects public health and the environment by funding essential drinking water and wastewater projects that otherwise would be financially unfeasible for these communities, eliminating untreated sewage discharges and improving the quality of surface and groundwater essential to the border area. The BWIP is the only federal program that can fund infrastructure projects on both sides of the border and one of the few federal programs that provides technical assistance for planning and design of drinking water and sanitation projects.

In the border region, close proximity and significant intermingling of populations poses a serious risk of disease exposure and transmission as a result of unsafe drinking water and inadequate sanitation. The BWIP helps reduce the potential for cross border disease exposure protecting the environment and public health. BWIP projects have reduced discharges of organic waste by more than 143 million pounds per year into transboundary surface waters and groundwater.

Removal of other contaminants, such as suspended solids, toxic ammonia, nutrients and pathogens, has improved water quality at beaches and in rivers throughout the border region.

Many residents of small, economically distressed communities along the U.S.-Mexico border have inadequate or no access to basic drinking water and sanitation. These communities often lack the resources to plan and secure construction funding of critically needed infrastructure. The BWIP provides financial and technical assistance so these communities can afford access to safe drinking water and wastewater infrastructure, reducing disproportionate public health risks and environmental impact from raw sewage discharges. BWIP technical assistance provides hands-on management and technical oversight for planning, engineering, environmental review and design becoming a critical bridge between proposed projects and their construction.

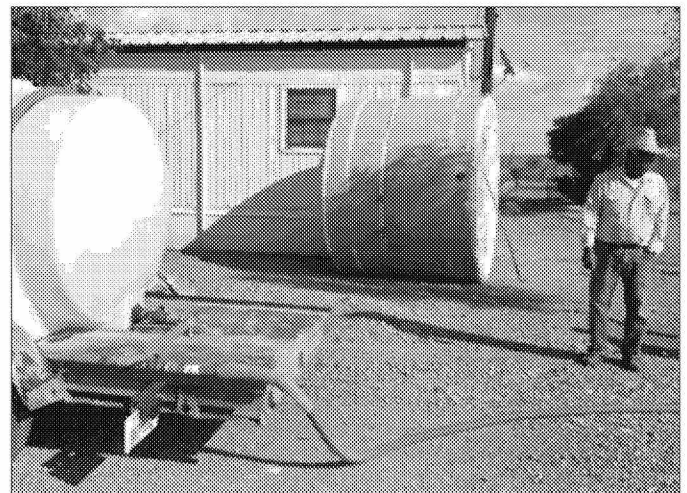
Case Study/example

Colonia Las Pampas is an economically distressed community of approximately 6,500 residents with no access to viable water supply sources and for years, its residents have

been hauling water from the city of Presidio, Texas, for their basic water needs so the city has applied for BWIP funding to extend water services to Colonia Las Pampas. BWIP efforts included a water use audit, which showed the city was facing high levels of water loss, failing infrastructure and low billing rates requiring supplemental funding. BWIP is assisting Presidio with the planning and design of critical rehabilitation of the existing system and expansion of water lines to bring safe drinking water to approximately 30 homes in Colonia Las Pampas. Once planning and design is complete, Presidio will be able to apply for construction funding, which is estimated at \$870,000 USD.

The BWIP is an integral component of the Border 2020 Program; in 2015 provided first time access to safe drinking water

to more than 800 border homes and wastewater collection and treatment services to more than 44,000 homes. Since 2003, the BWIP has provided first-time access to safe drinking water to approximately 65,600 homes and first-time access to wastewater collection and treatment services to more than 626,000 homes.



A resident of the colony Las Pampas receives drinking water from a pipe truck.

GOAL 3: PROMOTE MATERIALS AND WASTE MANAGEMENT AND CLEAN SITES

Waste generation diagnostic for the Northeast Border Region.

The Secretary of Sustainable Development of the State of Nuevo León was the recipient of a grant in the amount of \$21,798 USD for the purpose of developing a diagnostic prediction model of generated solid waste in the Northeast region utilizing sampling from one of the communities in order to better understand the waste generation in the region and help develop stronger solid waste management plans.

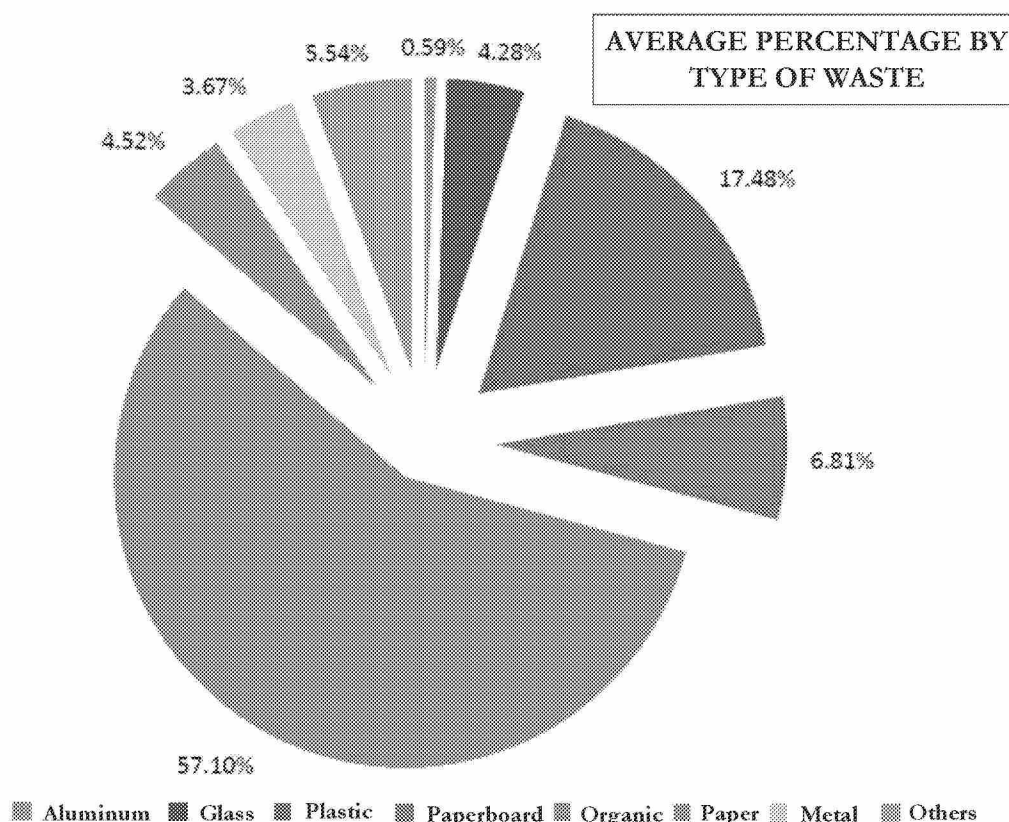
The 12-month long project consisted of con-

ducting a seven-day study in 204 homes in *Sabinas Hidalgo*, Nuevo León, within three socioeconomic groups (high, low, and very low) according to Mexican standards. The study aided in creating a dataset to help understand the generation of urban waste. A prediction model for municipal solid waste generation was developed and its data reliability was tested based on the municipality under study. The data was also used for verification purposes of the prediction model based on the socioeconomic variables.

The seven municipalities modeled were *Anahuac*, *Bustamante*, *China*, *Lampazos de Naranjo*, *General Bravo*, *General Terán* and *Sabinas Hidalgo*. The waste was classified into seven different materials in order to make accurate percentages of household waste within the categories of plastic, glass, paper, cardboard, aluminum, metal, organic and others.

Once the model was tested, a projection of the next ten years was created with respect to waste

output and type. The largest reported waste across all three socioeconomic groups was the 'organic and other' category accounting for 57% of total waste, with plastic coming in as the second most produced waste at 17.5% (see graph for full percentages). The final outcome of the project helped to create a management plan focused on plastics and their utilization. Lastly, a program guide for integrated waste management was developed.



Building capacity to safely and efficiently manage electronic waste in Mexicali.



Poster for the public campaign Recolectra.

The city of Mexicali, Baja California, is one of the strategic points for the commercial exchange between México and the United States. Similarly, Mexicali is amongst the Mexican border cities with the largest number of Maquiladora industries. These two characteristics contribute to the region having both important quantities of new electronics purchased and electronic discards. Electronic discards, otherwise

known as e-waste, often accumulate in homes and ultimately is discarded into landfills or worse, illegally dumped. Furthermore, the informal sector markets, often take the most valuable components, such as metal circuit boards, under unsafe conditions. To address worker safety and public health and environmental risks associated with e-waste, the Border 2020 Program has supported efforts to build public awareness

about these concerns and promote the use of certified recyclers and best management practices.

Under the Border 2020 Program, *Fundación Hélice A.C.* implemented a project in the city of Mexicali to achieve the following objectives:

- Train regional electronic recyclers on international certifications offered by R2 and e-Stewards, with the overall goal to increase adoption of best practices and ultimately increase the number of certified electronic recyclers.
- Increase public awareness about worker safety and public and environmental risks of e-waste through a local communication campaign, RECOLECTRA, including public schools in Mexicali about e-waste issues and importance of diverting e-waste from landfills to recyclers who

can appropriately manage them.

- Implement neighborhood e-waste collection events to facilitate the appropriate disposition of discarded electronics.

Fundación Hélice A.C. completed two workshops with 59 persons from recycling enterprises, electronic generators, university institutions, environmental consultants, and state and local government agencies. Over a period of five months, they reached 100 thousand people not only in the city of Mexicali, but also in the city of Calexico, California.

Finally, through the e-waste collection *RECOLECTRA* campaign, they collected 21 tons of discarded electronics that was processed by two recycling enterprises, recovering valuable plastic, printed circuits, precious metals, and other materials for re-use.



One of the workshops for recycling enterprises and electronic generators.

Bio solids recycling agriculture at Juárez valley.

The Autonomous University of Ciudad Juárez (UACJ, by its acronym in Spanish) received a Border 2020 Program grant for \$44,850 USD to conduct research pertaining to bio-solid recycling in agricultural soils in the Juárez Valley in Chihuahua. Currently, the two main wastewater treatment plants in Ciudad Juárez produce on average 91m³ annually of sewage and 105,000m³ of biosolids. The final disposal of the sewage sludge is the municipal landfill, just south of the city.

The project objectives included the development of a program that would encourage agriculture farmers in the Juárez Valley

to adopt using the wastewater plant's biosolids into their agricultural fields, in particular using the application of bio-solids for cotton or sorghum during the summer months and wheat or oats during the winter months. Another objective was to organize a demonstration camp for agriculturists and technicians regarding proper applications of the bio-solids in agricultural field. The project looked at creating a Committee on Bio-solids Utilization (CUB, by its acronym in Spanish) to create a group that would help oversee and ensure the availability and proper use of biosolids.

The project helped prove that the biosolid



A wheat field in San Isidro, Juárez. On the left, the control field where traditional fertilizers were used. At the right, the field fertilized with biosolids.

waste can be used as an organic form of fertilizer for the Juárez Valley. Approximately 25 thousand cubic meters of biosolids were utilized during the project; demonstrated on 100 hectares in 2015 and 500 hectares in 2016.

Several important steps resulted from the study: 1) volunteers found a link between residual waters and biosolid delivery to the

fields; 2) a registry was developed of new participants and their land parcels that would implement the use of bio-solids in their fields; and 3) the creation of the CUB committee, which will continue to communicate the effectiveness of biosolids in agriculture to stakeholders through several avenues of communication.

Tire amnesty collection events in El Paso County.

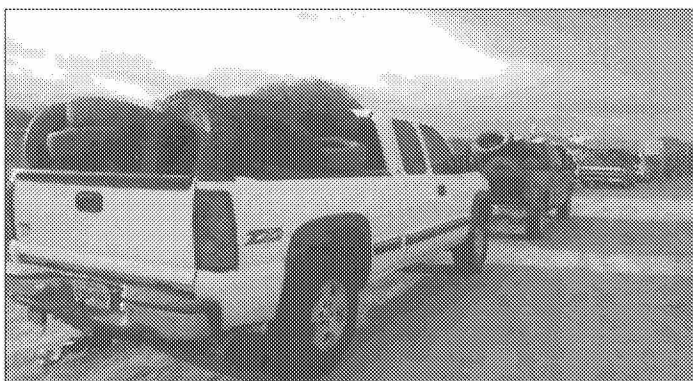
Illegal dumping of scrap tires in El Paso has long been a problem, as it is along various regions along the U.S.-Mexico Border. Often rogue tire transporters bypass the legal and regulated process of properly disposing scrap tires and choose to dump them in the

open desert, irrigation canals, drainage system and vacant properties. These illegal scrap tire piles often create the perfect breeding grounds for rodents and mosquitos that pose the threat of several mosquito-borne illnesses. Some of the illnesses related to mosqui-

tos are Malaria, Chikungunya, Dog Heartworm, Dengue, Yellow Fever, Eastern Equine Encephalitis, St. Louis Encephalitis, La-Crosse Encephalitis, Western Equine Encephalitis, West Nile Virus and Zika Virus.

The El Paso County Water Improvement District No.1 (EPCWID1) received a Border 2020 Program grant for \$15,000 USD to fund tire amnesty collection events in El Paso County, Texas. The project sponsored two events for free tire drop offs in order to deter illegal dumping. The objective of the project helped to clear unsightly

debris, protect groundwater, reduce crossing of tires to Mexico for resale, and most importantly to prevent the spread of diseases. The two events were held on April 12, 2014 and April 26, 2014 in Canutillo, Texas. The events were widely promoted with flyers and press releases in print, including newspapers. Approximately 12,000 scrap tires were collected and sent for proper disposal and recycling by a certified hauler. The EPCWID1 hopes to hold more events as needed, for example, when illegal dumping becomes noticeable, and/or possibly turning into an annual event.



Community members dropping off their scrap tires for proper disposal and recycling.

Tools to help Arizona border communities reclaim resources.

The illegal dumping of electronics results in the release of toxic chemicals into the air, soil, and water as they deteriorate and break down and can be absorbed by the human body through inhaling polluted air, drinking contaminated water or consuming food tainted from the chemicals seeping into the soil. The consumption of such chemicals can create several health conditions including increased asthma, respiratory problems and potentially cancer. This potential hazard has led to a statewide effort in Arizona to collect e-waste by encouraging the communities to recycle responsibly.

The Arizona Department of Environmental Quality (ADEQ) was awarded a Border 2020 Program grant to develop an e-waste toolkit, referred to as

“Tools to Help Arizona Border Communities Reclaim Resources” as well as provide training to participating communities on how to utilize the toolkit to run a successful e-waste collection event.

The projects primary objective was to reclaim valuable resources and reduce the electronics from going to Arizona landfills or being illegally dumped. This objective was accomplished by the following activities:

- Develop and implement a web-based bilingual toolkit designed to provide municipalities with certified e-waste recycler contacts, marketing supplies, educational resources and best practices to run a successful e-waste event;
- Support communities in

holding e-waste collection events, using the toolkit to create a series of annual e-waste events;

- Promote use of certified recyclers to safely and efficiently recycle discarded electronics; and
- Increase the number of e-waste events in the border region.

Thru this project, ADEQ strengthened the State e-waste recycling pro-

gram. The E-waste Recycling Events Toolkit was used by six cities to implement their own e-waste event and for some of the cities this was their first ever e-waste recycling event. A total of 21 participants took part in the E-waste Recycling Events Toolkit trainings and helped organize six e-waste events that collected a total of 63,656 pounds of electronics.



Electronics collected during one of the e-waste recycling events.

Ysleta del Sur Pueblo Community Collection Center.

The Ysleta Del Sur Pueblo (YDSP) Environmental and Natural Resources Department (ENRD) received a Border 2020 Program grant for \$66,670 USD to help establish a community collection center for the Tigua community. The project also provided educational materials to the tribal community on the proper handling and disposal of hazardous waste products and appropriate recycling practices.

The project included 33 clean up and mitigation activities that included: tire amnesty, flood mitigation, recycling bin cleanups, e-waste collection and aluminum can collections that are not normally offered in the area. The ENRD had several amnesty tire events in which residents were able to turn in used tires without having to pay a disposal fee charge. During the length of the project, the ENRD was able to collect a total of 250

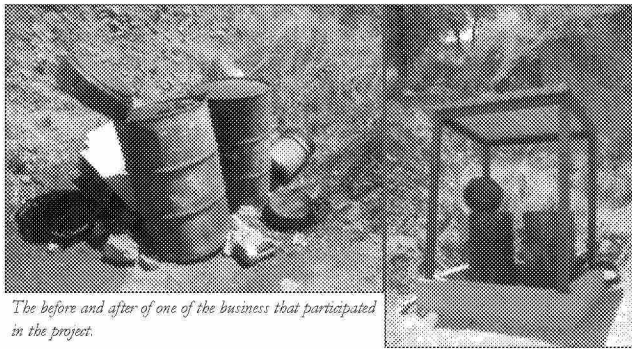
tires.

Additionally, 225 homes in the District II Tribal residency received recycling collection bins, with additional bins set out throughout the community, helping to increase participation of recycling. The project saw a successful e-waste collection of over 10,800 pounds and a collection of 5,420 pounds of recycled material. The challenge encountered during

the project's 18-month period was the accumulation of unrecyclable waste in the recycle bins.

Another challenge encountered during the project period was that as a recycling commodity, the E-waste market was very volatile such that instead of it becoming a source of revenue for the Tribe, became an expenditure.

Capacity building in the management of hazardous wastes in Nogales.



The before and after of one of the business that participated in the project.

Improperly disposed used motor oil, considered a hazardous waste in Mexico, contributes to environmental contamination of our land and waterways. To address the threats posed by mismanaged motor oil, the Border 2020 Program awarded a grant to the Secretariat for Urban Development and Ecology (SEDUE, by its acronym in Spanish) of Nogales, Sonora to build capacity through training and

infrastructure to collect small quantity generators' motor oil and facilitate its recycling. This program included the following activities:

- Train owners and managers of small quantity generators (micro-generators, less than 400 kg/yr) auto shops on regulatory requirements and proper management of used oil;
- Increase public awareness

of the potential environmental impacts and proper management practices; and

- Develop infrastructure to facilitate collection of used motor oil from small quantity generators.

Through this grant, Nogales has been able to further train 80% of those used motor oil generators. The project identified 134 establishments whose activities involve the generation of waste oils and other substances such as antifreeze and brake fluids. Of these, 107 stores were integrated into the project (92%) and 57 have already registered with the SEMARNAT as small quantity generator and 45 were in some stage of the registration process. In the period of implementation of

this project, 398,000 liters (105,140 gallons) of used oil were collected properly.

Similarly, over 100 people attended two training workshops that were held in the city of Nogales with participants also receiving used oil management manuals. Two collection centers, within waste management facilities already in operation, were also established in the city through an agreement with the company *Recicladora Pedraza S.A. de C.V.* to reduce operating costs. Finally, with the aim of promoting best management practices of hazardous waste and to establish a plan of sustainable integrated management of used oil, a public media campaign was launched along with delivering brochures.

Alamo Recycling Team Includes Everyone (ARTIE) Program.

The City of Alamo, Texas, was awarded a Border 2020 grant for \$54,838 in order to create a healthier, cleaner environment by enhancing the city's solid waste and recycling programs, as well as increase environmental stewardship within the community. The project focused on creating a recycling solid waste system improvements through a holistic approach. In conjunction with another grant that was awarded to the City from the Lower Rio Grande Valley Development Council, the city was able to build capacity by hiring additional environmental staff, purchase equipment and supplies, provide bi-

lingual marketing materials, conduct community presentations, hold a recycling mascot contest (358 proposals received) and develop environmental partnerships within the community. Dissemination of information of the education materials was not only done by community presentations, but also utilizing the City's media outlets (social networks, local newspaper, TV station). The city was also able to purchase and install 10 solar powered cameras that were placed in previously identified top "dumping hotspots" throughout the city. Overall, utilizing both grants, the city of Alamo:

- Conducted 5 community presentations with over 1,270 students in attendance;
- 5000 bi-lingual Recycling brochures developed (Recycling, tire disposal & hazardous waste);
- Enhanced solid waste systems established: revolving recycling trailer schedule determined and maintained for schools & winter Texans resorts;
- Community clean-ups conducted & one hazardous waste collection event conducted;
- Storm Drain stenciling conducted- utilizing city storm water map book;
- City staff was able to see a decrease in illegal dumping by as much as 238 tons/year with the installation of the cameras; and
- Established new Environmental partnerships: RDA for collection of electronic waste and Captain D. Salinas Elementary for the Salinasville Minitropolis Project.

Supporting Pharr efforts to maintain a clean community.

The city of Pharr, Texas was awarded two Border 2020 Program grants aimed to prevent illegal dumping and raise awareness among the residents in the city. The first grant for \$20,000 USD was awarded to a project to combat the illegal disposal of scrap tires. The grant was used to create an incentive program to help curb illegal dumping by holding a monthly tire collection event, for three months, in which residents could collect as much as 50¢ per tire. With the support of over 50 volunteers and city staff, 10.95 tons of scrap tires were collected and sent for recycling. The importance of cleaning up tire waste is a way to combat potential mosquito-borne breeding grounds that can lead to illnesses. The

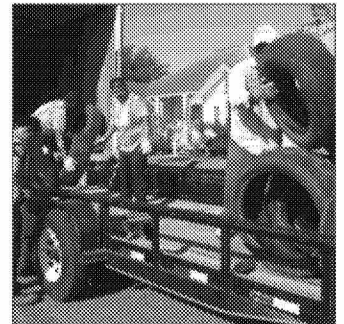
city continues to hold community clean up incentive programs to help accomplish the goal of being one of the cleanest cities in the Rio Grande Valley.

The second grant of \$20,000 USD awarded, helped to increase outreach and awareness surrounding illegal dumping and increase volunteer opportunities through such efforts as community programs such as Operation Clean Sweep. This project focused on developing a bilingual public outreach campaign to help combat illegal dumping and market the message in the community “Keeping Pharr Beautiful...Starts at Home”.

The city arranged to have clean up events that encouraged residents to

bring in their used tire waste in order to deter illegal dumping, as well as, letting homeowners become aware of the citations they may face if they store more than five tires at once in their home. The city also implemented a monthly volunteer clean-up program from December 2014 through September 2015 where residents were able to help pick-up trash collected on roads or larger lots. During the scrap tire collection events, over 4,413 scrap tires were collected. The City of Pharr also had an informational workshop on August 2014, in order to teach residents about: the current state rules governing used and scrap tires; the criminal laws that are available for use by local governments to control scrap tire waste; and the

common areas of policy violation. A third outcome from this project was the implementation of “Adopt a landscape corner,” which allowed local businesses to “adopt” a street side area for beautification through landscaping. The project also funded a competition at elementary schools that encouraged recycling.



One of the three scrap tires collection events held at Pharr.

Promotoras-led environmental health education to children in Eagle Pass.

Southwest Border Area Health Education Center (AHEC) was a recipient of a \$69,083 USD Border 2020 Program grant that led to an 18-month information campaign to improve children's health through the aide of *Promotoras* (community health workers) who provided environmental health information to young children and community members on asthma, exposures to lead, pesticide and mercury.

The *Promotoras* model was used for reaching

out to parents and care givers, school teachers and child care providers with the aim of improving environments in and around the home, school and childcare facilities. This region has higher than average incidences of asthmatic symptoms in children than the national average.

Several trainings between March and May of 2015 were held for 73 teachers and support staff from Seco Mines Elementary, Pete Gallego Elementary and Seco Mines Headstart

Center. During this same period, a total of 774 students (aged 6 up to 11) from these participating schools received education on indoor air quality, outdoor (ambient) air quality, hazardous materials, pesticide use and management, and waste management. In addition, students at a daycare center received a presentation on lead. Pre and post assessments of residents showed an improvement in knowledge, with some actually testing their homes for certain environmental chemicals such as lead. The

Promotoras also arranged two separate cleaning campaign events along two miles of the Elm Creek subdivision in August 2015. A total of 78 (33-gallon) trash bags was collected by volunteers at the clean-up event.

Working to keep Tijuana clean.

To support the City of Tijuana, Baja California, in reducing waste generation and diverting recyclable materials from going into landfills, the Border 2020 Program awarded two grants to demonstrate the viability of composting and to reduce plastic trash on beaches near the city.

With one grant, the *Colegio de la Frontera Norte* (COLEF, by its acronym in Spanish), a Border 2020 Program partner, is leading a food scraps composting pilot with Tijuana households near *Ecoparque*, a prototype of a sustainable community established by COLEF. The project, led by Dr. Carlos de la Parra, has 104 households participating and in late June 2016,



Food scrap composting activities in Tijuana.

they reported collecting 1200 bags of organics with only one unacceptable bag. The household's successful adherence to protocols was attributed to the households volunteering to adhere to detailed protocols demonstrated at a required workshop.

COLEF is collaborating with Tijuana environmental and public works departments to share results as input for developing their own program. The compost pilot is working under an USEPA approved Quality Assurance Project Plan (QAPP) for conducting field monitoring and lab analysis associated with parameters to assess the composting process (e.g. air flow, pH, moisture) and compost characteristics (e.g. carbon, granularity), metals, organics).

The other grant was awarded to *Proyecto Fronterizo de Educación Ambiental*, a civil organization that launched the "Ocean Friendly Restaurants", a program adapted



Promoters of the Ocean Friendly Restaurants program.

from Surf Rider in San Diego to reduce trash, especially Styrofoam single-use containers in restaurants along Tijuana's beach areas.

Their work includes an outreach campaign to inform restaurants and patrons about the value of patronizing restaurants certified as ocean friendly practices, which includes compelling 60-second Spanish language videos that align with USEPA's global "Trash Free Waters" program (you can view the videos using this [link](#) with the password Specola).

The project team identified 13 restaurants in

Tijuana's Playas district and set a goal to certify 12 as part of this initial pilot. In March of 2016, they participated in the 31st cleanup event called "*Salvemos la Playa*", collecting 6 tons of beach trash along with many sponsors from the public and private sector. The restaurants committing to make changes will be trained, assisted in implementing changes, and be considered part of a network of certified Ocean Friendly restaurants. For more information, please visit the webpage of [Proyecto Fronterizo de Educación Ambiental](#).

Cleaning and transforming public spaces for recreation and ecological benefits in Mexicali.

The New River, also known as the Hardy River, originates in the northern part of the Mexicali Valley in Mexico and flows through the Mexicali and Calexico urban areas before discharging in the Salton Sea in the United

States. Trash disposed in rivers and agricultural drains remains a serious binational environmental contamination issue, contributing to public health threat, including vectors of disease and urban blight. The inadequate management of solid

waste, along with air quality and other environmental issues, further contribute to an already highly impacted border community.

To address the trash, including scrap tires and other discarded materi-



One of the "Mexicali Fluye" campaign brochures.

als, the Sonoran Institute, in

partnership with the Border 2020 Program, developed a project with a fresh, innovative and integrated approach that aims to transform agricultural drains into green corridors, with recreational and ecological benefits. In collaboration and coordination with municipal, state, and federal government agencies, along with community members and non-profit organizations, the goal was to mitigate dumping through an integrated approach that addresses lack of adequate municipal services, enforcement, and environmental education.

The main objectives of this project were: 1) cleanup 1.5 km of the section known as the Interna-

tional Drain, and 2) development of an integrated waste management model that provides for short and long-term solutions to illegal trash dumping that contribute to the New River pollution.

During the implementation period, the Sonoran Institute conducted multiple site visits to the International Drain site and

the surrounding communities to identify and establish communications with local schools, civil organizations and businesses; estimate the type and volume of solid waste at households and in the drain itself; identify existing local recycling opportunities and identify existing and potential rehabilitation opportunities.

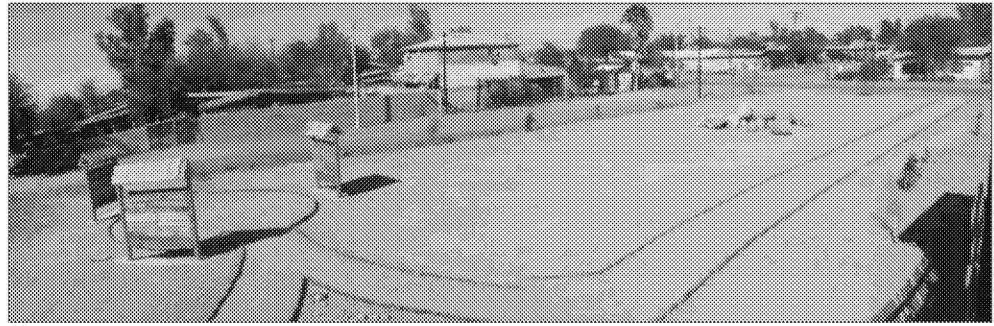
The Sonoran Institute has successfully engaged 21 organizations from federal, state and local government agencies, as well as, private, non-profit, and academic sectors. Furthermore, they recruited neighborhood and other volunteers to assist with cleanup and other activities. A summary of the most significant accomplishments are listed below:

- Implemented ten cleanup events that removed and properly disposed of 2,098 m³ of trash, tires, and other materials from a 1.5 km section of the International Drain.
- Worked to mitigate future dumping by installing large trash containers and bins in areas where service was lacking and installed two time-lapse cameras to deter illegal

dumping and vandalism.

- Launched a public campaign to stop dumping and encourage environmental stewardship, referred to as “*Mexicali Fluye*” throughout the city of Mexicali.
- Designed and installed landscape improvements transforming drain areas into walkable, park areas along 1,500 m² including planting of 20 native trees, a walking trail and benches.

For the community park, a drip irrigation system and eco-efficient lamps will be installed to secure the long-term maintenance of this protected site. The Sonoran Institute is working with the environmental protection agency of Mexicali to request the concession of the federal area where the park is located. The success of this project resulted in two new grants to rehabilitate five km along five additional drains.



The Community Park area with some of the planted trees around it.



Before and after in the Community Park area.

Regional plan for waste management in Ascension and Janos.



Ruined buildings at the "La Fundidora" site.

A Border 2020 Program grant was awarded to develop an integrated waste management plan for Ascension and Janos, Chihuahua. The plan sought to demonstrate that through proper waste segregation and recovery of waste materials, the waste going to the landfill could significantly be reduced, therefore, extending the life of the landfill. The implementation of the plan would also reduce the financial burden to the municipalities and transform waste into recoverable materials.

The Project carried out by the *Red Integral de Manejo de Residuos para el Desarrollo Sustentable, A.C.*, a

civil organization, focused on five objectives:

- Develop a Regional Plan of Integrated Waste Management for municipalities of Ascension and Janos, Chihuahua.
- Identify two places contaminated with waste of the processing of lead-acid batteries in the municipality of Ascension and if feasible, their integration into the National Inventory of Polluted Sites (SISCO, by its acronym in Spanish).
- Identify the operation of a separation and sorting solid waste system for their valorization.

- Install a permanent collection center for the communities focused on collecting household hazardous waste such as used oils, filters, paints, solvents, containers, electric batteries and pesticide containers.
- Hold a regional workshop on dissemination of results. The workshop would present the results of the Regional Waste Management Plan, the strategies for implementing the plan, the diagnostic results of two contaminated places and the establishment of a collection center for collecting household hazardous waste.

The two contaminated sites had been identified since 2003. The first property owned by *Huerza, S.A. de C.V.*, known as "La Fundidora", had waste on the site comprised of piles of used lead-acid batteries, battery housings, containers with lubricant used oils and lead smelting waste, among others; as well as evidence

of high levels of natural soil contamination by dangerous waste such as arsenic and cadmium.

The second contaminated site, located on the property "Los Temporales", was identified as having land contamination that potentially posed a risk to the *Mimbres* Aquifer, a trans-boundary aquifer from which drinking water and agricultural irrigation for Palomas, Chihuahua, and Columbus, New Mexico, is extracted.

The study recommended that both sites needed to be remediated due to the contaminants found at each site. There is a higher priority to clean up the site identified as "La Fundidora" due to the fact that it contains high amounts of soluble metals such as, lead, arsenic, and cadmium in the soil. A medium level priority cleanup was given to the site "Los Temporales".

End-of-life Vehicles Guide.

Under Border 2020 Program, USEPA and SEMARNAT have produced an End-of-life Vehicles Guide. The guide was requested to address the needs of auto recyclers in the border region. The guide includes information on the environmentally sound manner of preparing end-of-life vehicles so that

they are ready to be processed by metal scrappers. It addresses a waste stream that can pose an especially high risk to human health and the environment because of the hazardous materials which should be removed before a vehicle is sent to a scrap yard. The complete packet will include a folder consisting of the

guide, waste cards, a poster and a CD-ROM with a digital copy of the printed material. All materials are available in English and Spanish and will be distributed along the U.S.-Mexico Border.

The specific waste-streams highlighted on the waste cards for removal are lead, mercury switches, re-

frigerants, waste batteries, waste fluids and waste fuel; and include, for each one, a detailed description of proper handling techniques with diagrams. The waste cards and poster are intended to be displayed in the handling facility so that technicians can reference the environmentally sound management practices quickly and easily.

GOAL 4: ENHANCE JOINT PREPAREDNESS FOR ENVIRONMENTAL RESPONSE

Hazardous railcar leak mitigation preparedness in the Paso del Norte region.



First responders at the training provided by BNSF Railway.

The City of El Paso received a Border 2020 Program grant of \$30,000 USD in 2015 to increase preparedness and response involving hazardous railcar leak incidences in the Paso del Norte region. Hazardous rail cargo crosses the international boundary via the “Black Bridge” between El Paso, Texas and Juárez, Chihuahua. Many of the railcars are staged in downtown El Paso, with the potential of exposing thousands of people in both El Paso and Ciudad Juárez to an incident that would have an immediate and dire effect on the populace and environment when exposed to a hazardous substance. In addition, a newly constructed inter-modal facility in Doña Ana County, New Mexico, adjacent to the Santa Teresa Port of Entry has increased the amount of rail traffic in

the region, thus, increasing the potential for hazardous railcar incidents.

The project funded helped to increase preparedness for possible hazardous railcar incidences, increase mitigation capabilities and to re-establish and continue communications between first responders between the communities of El Paso, Ciudad Juárez and Doña Ana County. The project entailed the purchase of the three Midland Kits, equipment used to stop and contain leaks that may occur if a railcar incident were to occur involving hazardous substances. Each of the jurisdictions received one of these kits because none of them had this piece of equipment prior to the grant. The kits are the most state of the art pieces of equipment that first re-

sponders can utilize for such incidences. The equipment was necessary, as the rail industry has changed to what is termed “next generation” railcars for the transportation of a diverse array of hazardous materials. These new railcars use different valves and fittings to load and unload the material being transported, thereby making much of the traditional mitigation equipment the region possessed now obsolete.

In July 2015, during a three-day period, more than 120 first responders from El Paso, Ciudad Juárez and Doña Ana County Fire Department received the proper training needed to operate and learn how to use the Midland Kits. Trainers from BNSF Railway, who invented the Midland Kit, trained the responders utilizing a mock railcar that was transported from their training rail yard. The training consisted of lecture, PowerPoint and dialogue between the training participants and instructors. The final portion of the training involved using a Midland Kit on a training rail car, to properly learn how to handle this piece of equipment. The training event was covered by the local media, generating six news stories on

the local television in El Paso and Juárez, as well as, two newspaper articles, one in the El Paso Times and another in the *Diario de Juárez*.

In April 2016, once the Midland kits had been purchased by El Paso Fire Department, a half-day refresher training was held with representatives from each of the jurisdictions. In addition, that day each of the jurisdictions received their own Midland Kit to take back to their respective cities. With the funding of this project, the first responders within the region are now better equipped and prepared to deal with hazardous materials spills involving railcars. Furthermore, there is an increase in awareness and knowledge among the first responders of the threats that involve railcars in the region. Finally, communication among the jurisdictions was re-established and strengthened with the training event that occurred.

Arizona-Sonora emergency preparedness & response collaboration.

The emergency prevention, preparedness and response efforts are focused on enhanced communications, exercises, training and equipment exchange to foster cross-border collaboration and to mitigate environmental impacts caused by disasters. The Arizona-Sonora Task Force has had remarkable success, a few of the many examples include:

- Over the last five years, 7,136 first responders and emergency managers have been trained. Topics included: Incident Command System, First Responder Awareness, First Responder Operator, HazMat Refresher and Traffic Incident Management System.
- A binational full scale and notification exercise was conducted in Agua Prieta, Sonora, on July 10, 2015, involving two tanker trucks carrying Sodium Hydrosulfide and Ferro Cyanide colliding with a vehicle at the border crossing. The exercise was sponsored by PROFEPA and involved first responders and emergency managers
- In the Fall of 2015, the city of Wilcox, Arizona, donated personal protective equipment (jackets, helmets, boots, gloves), hoses and other fire-fighting equipment to the Border 2020 Program for delivery to Sonoran fire departments.
- The Task Force hosted a five day training course (1/2 day course offered multiple times) provided by Union Pacific in Nogales, Arizona. Over 250 people from the U.S. and Mexico participated in the course that focused on an introduction to railroad operations and the associated hazards related to tanker cars carrying sulfuric acid.
- The Santa Cruz County Office of Emergency Management will facilitate data and information exchange through training at six locations along the Arizona-Sonora border. The training covers several software applications: 1) WebEOC (Web Based Emergency Operations

from both sides of the border.



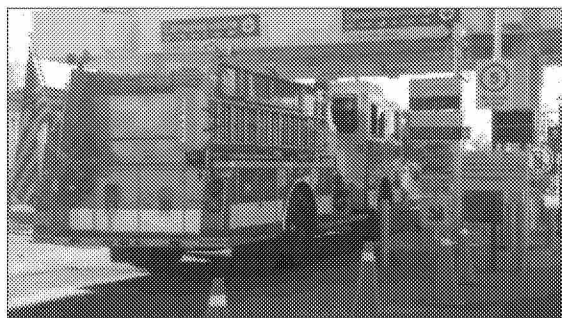
First responders during one bi-national exercise.

Center) allows real time communications amongst responders at the scene with command personnel; 2) CAMEO (Computer-Aided Management of Emergency Operations) can be used to access, store and evaluate information critical for developing emergency plans; and 3) ALOHA (Areal Locations Of Hazardous Atmospheres) allows the user to estimate the downwind dispersion of a chemical cloud.

All of these efforts along with ongoing efforts to update Sister City Emergency Plans support preventing and minimizing the magnitude of emergency incidents along the border. For example, cross-border cooperation provided the immediate support to address an Agua Prieta, Sonora, warehouse fire. The binational plan was activated in response to the warehouse fire at 03:50 am on March 5, 2016. The Douglas, Arizona, Fire Depart-

ment responded with one engine and two firefighters on board and stayed on scene for approximately 6.5 hours to address the incident. The smoke was a threat to both cities.

In another incident, the training, equipment, planning and exercises paved the way for a successful cross-border emergency: on March 1st, 2016, the city of Agua Prieta activated the binational plan due to an uncontrolled tire fire. The Douglas Fire Department responded with one Engine and three Firefighters on board.



U.S. firefighters at one joint exercise.

Bi-national exercises at the cities of Harlingen and Matamoros.

The City of Harlingen received a \$60,000 USD Border 2020 Program grant for cross-training and exercises with the City of Matamoros. The objectives of the project included: training for the tactical incident management of on-scene operations at a Hazardous Materials Incident; preparing the First responders to manage during the first hour of a Hazardous Materials Incident; learning how to identify hazardous materials transporting containers; learning control techniques for leaks and spills and; training to use the Incident Command System (ICS) and remote communication technology. Part of the training included review of the sister-city contingency

plan in place and the use of it while conducting a tabletop and functional exercises.

The training and two exercises conducted took place in May 2016. The training included:

- **Rescue and Recovery:** Introduction response information exposure and contamination and decontamination procedures.
- **Personal Protective Equipment:** Chemical science personal protective equipment.
- **Product Control:** Container types product control measures.

The tabletop and functional exercises looked at a response that involved a release of a ton from a chlorine cylinder as well as a release of chlorine from a rail car. The project funded resulted in the enhancement of a bi-national response by including the latest technology advancements for communications; enhanced the re-

sponse capabilities of responding to a potential chemical exposure/accident that could affect both sides of the border; and updated the sister city plan contacts. The final day, which included the functional exercise, was covered by local media. The story can be found at the webpage of KVEO-TV.



Participants of the bi-national exercise.

Enhance joint preparedness for environmental emergencies.

In 2012, the Office of the Federal Attorney General for the Protection of the Environment (PROFEPA, by its acronym in Spanish) commemorated the 20th anniversary of its foundation by organizing a series of activities in the area of protection of the environment, focusing on the initiative of establishing a the National Chemical Emergency Preparedness and Response Day in view of its relevance and importance.

Thanks to the support provided by the public and private sector of Mexico, as well as by the USEPA, it has been possible

to carry out approximately 1,050 exercises and 285 training events involving the participation of approximately 150,000 people, along the 2,000 mile long Mexico-United States border. Of this total number of events, 20 binational exercises and 19 binational capacity-building workshops have been completed during the past four years. Significant coordination is necessary to accomplish these large events as PROFEPA and the USEPA work with the offices of Civil Protection, within Mexico's Secretariat of Governance, Mexican and U.S. States, local municipalities, and Tribal governments.

The National Chemical Emergency Preparedness and Response Day was commemorated on July 8, 2016 with the planning of four binational full scale exercises which were conducted along the United States-Mexico border sister cities of: Calxico and Mexicali; Ciudad Juarez and El Paso/Sunland Park; Eagle Pass and Piedras Negras and McAllen and Reynosa. All other 11 sister city contingency plans held notification exercises. The U.S.- México Joint Contingency Plan (JCP) binational notification system, undergoing final revisions, was tested by México's National Communication Center

(CENACOM, by its acronym in Spanish) during these exercises. The USEPA border offices in El Paso and San Diego have provided support via training workshops dealing with Incident Command System and Hazardous Materials incidents, including providing evaluators. In addition, the Office of Emergency Management has been coordinating the upgrades to the binational notification system of the JCP, with the National Response Center, administered by the US Coast Guard, in Washington, DC, making this a genuine border-wide effort.

GOAL 5: COMPLIANCE ASSURANCE AND ENVIRONMENTAL STEWARDSHIP

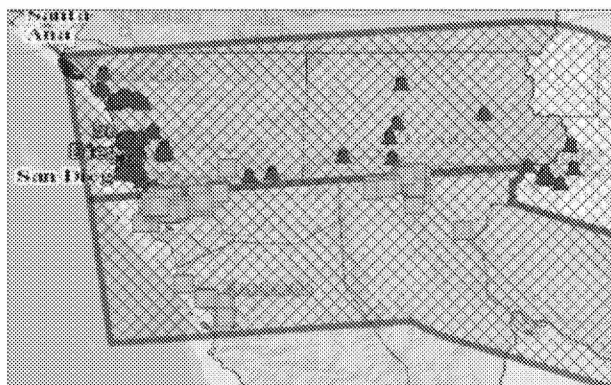
Industrial discharge and release fact sheet.

The Colorado School of Mines, a Border 2020 Program grantee, has prepared fact sheets on multi-media emissions and discharges from border industrial facilities reported by Mexico's Registry of Emissions and Transfer of Pollutants (RETC, by its acronym

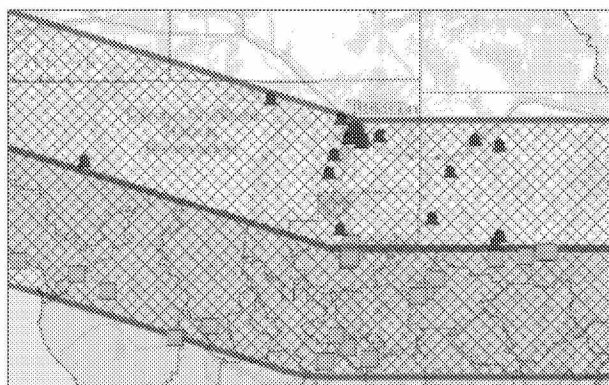
in Spanish) and the US Toxic Release Inventory (TRI) program data. The Border 2020 Program will subsequently work with border stakeholders to disseminate and assist border communities in interpreting and determining what if any further support these commu-

nities may need. The fact sheets were prepared for the Arizona-Sonora and the California-Baja California border regions. The maps below show the distribution of reporting facilities in the border. This project was developed to implement recommendations of the

Commission for Environmental Cooperation (CEC) report "Taking Stock" which advises to making this information more accessible and understandable for communities to use. Visit this [link](#) of the CEC webpage for the report.



Reporting facilities in California-Baja California border region.



Reporting facilities in Arizona-Sonora border region.

California regional solid waste working group.

In 2015, California's legislature (AB965) empowered the California-Mexico Relations Council with new authorities including the formation of the Border Solid Waste Workgroup to address waste tires, solid waste, and exces-

sive sediment in the border. In 2016, the Workgroup convened a broad stakeholder group to identify and propose short and long-term solutions to binational challenges in the California-Baja California border. The Workgroup awarded

\$300,000 USD in grants to Wildcoast for Tijuana tire cleanups and the Sonoran Institute for Calexico and Mexicali trash mitigation; and it is working collaboratively with the Border 2020 Program to implement elements of its strategy as it

moves into 2017. For more information visit Cal-EPA's [site](#).

COOPERATION TO IMPROVE ENVIRONMENTAL HEALTH



Over the past several years, the U.S. Environmental Protection Agency (USEPA) and the U.S. Section of the U.S.-Mexico Border Health Commission (BHC), U.S. Department of Health and Human Services (USDHHS) have developed a strategy to collaboratively address environmental and public health challenges of mutual concern and priority in the border region. Through this strategy, the USEPA and the BHC have committed to working more closely to fulfill and strengthen each organization's strategic frameworks along the U.S.-Mexico border, including the Border 2020 Program, and to protect Children's Environmental Health, a central component of USEPA's mission.

Public health, and particularly children's health, along the border can be affected by the mismanagement of pesticides, poor indoor and outdoor air quality, misuse of chemicals and

other waste, poor water quality, and binational chemical emergencies.

USEPA and BHC funds and in-kind support, Border 2020 Program grants, and leveraged resources from state and local partners have all supported the strategy to address children's environmental health in the border region. In the past three years, the U.S.-Mexico Border 2020 Program has provided more than \$500,000 to a dozen organizations to specifically address children's health. These efforts have included education and capacity building of childcare and school personnel on school and home environmental health; of farm workers and advocates on pesticide safety and take-home pesticide exposures; and of community health workers, or *Promotoras*, on a wide range of environmental health topics. With a focus on a train-the-trainer model, these efforts have directly impacted hun-

dreds of people who, in turn, share the knowledge and skills with hundreds more among their families and communities in the border region. Two examples of many recent successes include:

- **Children's Environmental Health Symposium.** USEPA and its Border 2020 Program and children's health partners, including BHC, worked together to plan and convene three symposia in the border region to increase knowledge of how early childhood exposure can affect children's health and to facilitate networking among the healthcare community, *Promotoras*, and the public. The first was held in El Paso, Texas on September 24-25, 2015 where more than 150 persons attended, traveling from Texas, New Mexico and Chihuahua. The second was held in San Diego, California on January 27-28, 2016 where 136 persons attended, traveling from California, Baja California, Arizona, and Sonora. Attendees included doctors, nurses, *Promotoras* and public health professionals. The third symposium was held August 25, 2015 in Browns-

ville, Texas, with over 130 attendees that included medical professional, academia, local, state and federal staff and community health care workers.

- ***Promotoras* Workshops.** EPA worked closely with BHC and its state and local partners to host ten training events for *Promotoras* who work in communities along the border between June and October 2015 including seven in Texas, one in Arizona, and two in California. A total of 400 *Promotoras* and public health professionals attended these trainings.

For a more detailed description of these and other accomplishments of children's environmental health in the border region, please see the [Border 2020 website](#) where USEPA has posted a stand-alone USEPA-BHC collaborative agreement accomplishments report.

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MISSION STATEMENT

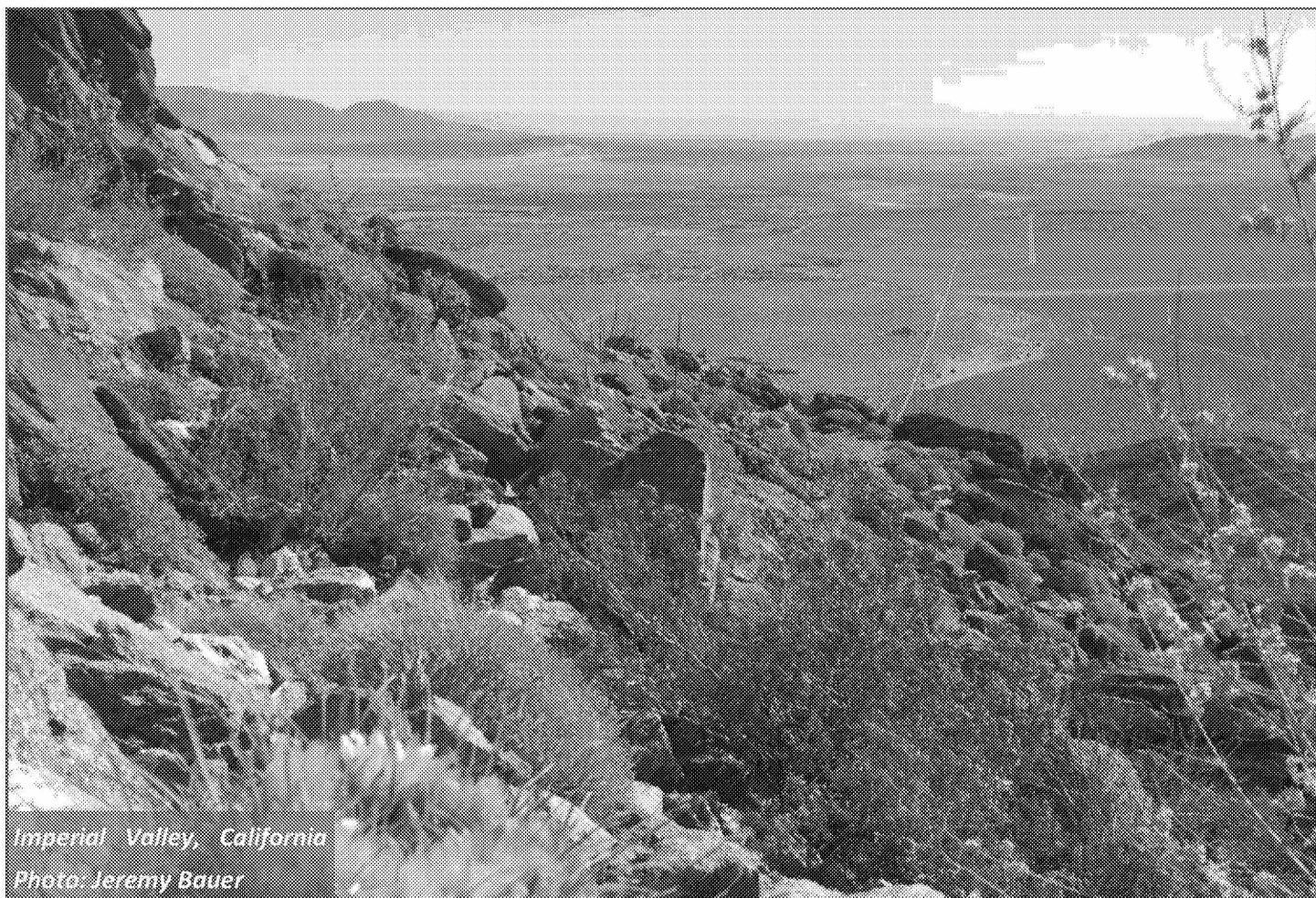
As a result of the partnership among U.S. Border Tribes and federal, state and local governments in the United States and Mexico, the mission of the Border 2020 program is to:

Protect the environment and public health in the U.S.-Mexico border region, consistent with the principles of sustainable development.

¡Visit our web pages!

www.epa.gov/border2020

www.gob.mx/semarnat



Imperial Valley, California
Photo: Jeremy Bauer